

SPACE SHUTTLE UPGRADES

(In Millions Of Real Year Dollars)

<u>SHUTTLE UPGRADES - PHASE I - S&PU</u>	<u>CATEGORY</u>	<u>TOTAL</u>	<u>START DATE</u>	<u>FIRST USE OF UPGRADE</u>
ALTERNATE TURBOPUMP (ATP)	S	956.3	April 94*	Aug-00
MULTIFUNCTION ELECTRONIC DISPLAY SYSTEM (MEDS)	O	210.1	Sep-92	1st Qtr 00
SUPER LIGHTWEIGHT TANK (SLWT)	P	127.4	Feb-94	Jun-98
PHASE II + POWERHEAD RETROFIT	S	351.5	Dec-86	Jul-95
LARGE THROAT MAIN COMBUSTION CHAMBER (LTMCC)	S	76.9	Mar-93	Jan-98
SIMPLIFIED AID FOR EVA RESCUE (SAFER)	S	17.8	FY 95	Oct-97
ORBITER APU NEW GAS GENERATOR VALV (NGGVM)	S	15.4	FY 95	1st Qtr 98
LIGHTWEIGHT SRB	P	46.0	FY 94	Dec-97
HARDWARE INTERFACE MODULE CARDS (HIM CARDS)	O	16.5	FY 93	Jun-98
<u>SHUTTLE UPGRADES - PHASE II - SUPPORTABILITY</u>				
CHECKOUT AND LAUNCH CONTROL SYSTEM (CLCS)	P	233.3	FY97	FY02
GLOBAL POSITIONING SYSTEM (GPS)	P	32.5	Oct-97	Jan-99
AIR DATA TRANSDUCER ASSEMBLY (ADTA)	P	6.0	FY 97	FY 98
SRB ALTITUDE SENSOR ASSEMBLY - SRB	P	3.8	FY 99	4TH Qtr FY 02
NOZZLE/CASE JOINT J-LEG INSULATION DESIGN - RSRM	S	3.9	FY 98	Jul-99
MICROMETEROID/ORBITAL DEBRIS MITIGATION (MMOD)	S	28.0	FY98	Dec-00
IMU REPLACEMENT (SIGI) - RSRM	P	4.8	FY 98	FY 00
ELECTRICAL APU - RSRM	S	9.4	FY 00	FY 01
DISPLAY DRIVER UNIT REPLACEMENT - RSRM	P	3.7	FY 99	Mar-00
MASS STORAGE UNIT - RSRM	P	19.0	FY 99	2nd Qtr FY 01
LONG LIFE ALKALINE FUEL CELL - RSRM	P	17.1	FY 99	Jun-99
ROBOTIC SITUATIONAL AWARENESS DISPLAY	P	0.5	FY 98	FY 00
LASER DYNAMIC RANGE IMAGER - FLIGHT TEST	S	1.4	FY 98	FY 00

S = Safety
O = Obsolescence
P = Performance

*Oxidizer Turbopump First Flight - 07/95. In December 1991, NASA deferred development of the HPFTP in order to concentrate development of the HPOTP. This resulted in a 28-month stop-work order on the HPFTP. Authorization to resume development of the HPFTP was received in April 1994.